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1989 UPPER BASIN INTERAGENCY STANDARDIZED MONITORING PROGRAM - GREEN AND COLORADO RIVERS HABITAT MAPPING USING AIRBORNE VIDEO

November 1990

U.S. DEPARTMENT OF THE INTERIOR
Bureau of Reclamation
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16. ABSTRACT

Reclamation (the Bureau of Reclamation) initiated the ISMP (interagency standardized monitoring program) to monitor endangered fish populations and their habitat in the Green and Colorado Rivers. Reclamation acquired airborne video for the ISMP to quantify backwaters, side channels, and channel width by river mile for two monitoring reaches in the Green and Colorado Rivers. The upper monitoring reaches of the Green and Colorado Rivers were generally wider and had substantially more backwater and side channel habitat than their lower reaches. There were significantly fewer and larger backwaters in the Green River during 1989 than 1988. Several years of video data will be required to determine any correlation between habitat and fish capture data.

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1989 UPPER BASIN INTERAGENCY STANDARDIZED MONITORING PROGRAM - GREEN AND COLORADO RIVERS HABITAT MAPPING USING AIRBORNE VIDEO

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November 1990

UNITED STATES DEPARTMENT OF THE INTERIOR ★ BUREAU OF RECLAMATION

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BACKGROUND

Following the construction of Flaming Gorge Dam in 1962, the abundance of endemic fish species in the Green River has decreased. These species include the endangered Colorado squawfish (*Ptychocheilus lucius*), the humpback chub (*Gila cypha*), and the rare, but unlisted, razorback sucker (*Xyrauchen texanus*). The dam has altered the natural state of the Green River by reducing flood events and their severity, increasing late fall and winter fluctuations, and in general altering natural flows throughout the year (Tyus et al., 1987). Studies conducted by the Fish and Wildlife Service (Service) have concluded that backwaters in the Green River serve as important nursery habitat for young-of-the-year Colorado squawfish (Tyus et al., 1987; Tyus and McAda, 1984). The Remote Sensing Section, Research and Laboratory Services Division, Bureau of Reclamation (Reclamation), has been studying the use of remote sensing techniques and the effects of Flaming Gorge Dam releases on downstream fish habitat in the Green River since summer 1986 (Pucherelli et al., 1988, 1989a, 1989b; Pucherelli and Clark, 1989).

Reclamation initiated an ISMP (interagency standardized monitoring program) for the upper basin reaches of the Green and Colorado Rivers, beginning at their confluence. Study parameters were collected in a standardized fashion and include various fish species and their habitats, including backwaters and side channels. This monitoring process will allow a correlation between fish capture data and the quantification of their habitat.

Although aerial photography is currently the optimum method for mapping and determining various riverine habitat, the cost of this method is prohibitive for extensive studies. Consequently, a more cost-effective alternative for mapping backwater availability using videography was investigated during 1988 (Pucherelli and Clark, 1989). The investigation found that the quality of videography was sufficient to replace aerial photography for use in river monitoring studies.

The objectives of this study were (1) to calculate backwater and side channel numbers and area and channel width by river-mile for four monitoring reaches on the Green and Colorado Rivers; (2) to correlate the river habitat data with CPUE (catch-per-unit effort) data collected by participating agencies - the Service, the Colorado Division of Wildlife, and the Utah Division of Wildlife Resources; and (3) to correlate backwater and side channel data with riverflow. Valuable information will be compiled to assist managers and researchers in facilitating the recovery of the endangered fish in the upper Colorado River Basin.

METHODS

Four study reaches were selected by the Service, Reclamation, and State wildlife agencies from Colorado and Utah in areas known to contain important backwater habitat for young-of-the-year Colorado squawfish: reach 1 - Colorado River from the confluence with the Green River to river-mile 110 (Cisco Landing); reach 2 -Colorado River, river-miles 140 to 170 (Ruby Canyon to Grand Junction); reach 3 - Green River from the confluence with the Colorado River to river-mile 120 (town of Green River, Utah); and reach 4 - Green River, river-miles 200 to 317 (beginning of Desolation Canyon to Split Mountain). River-mile designations were established by measuring distance along the center line of the river directly on GS (Geological Survey) 7.5-minute topographic quadrangles with a map wheel.

Video was acquired on September 26, 27, and 28, 1989. The upper and lower reaches of the Colorado River were flown on September 26; the Green River was flown September 27 from the confluence (river-mile 0) to approximately the Ouray bridge (river-mile 245), and on September 28 from the Ouray bridge to the confluence of the Green and Yampa Rivers. Flows (ft^3/s) as measured at various GS gauges (GS Water Resources records) for these dates, as well as those for the Green River during 1988, were as follows:

	Colorado River		Green River	
	Cameo gauge	State Line gauge*	Jensen gauge	Green River gauge
1989	ft^3/s	ft^3/s	ft^3/s	ft^3/s
Sept. 26	1,990	2,990	1,023	1,660
Sept. 27	1,970	2,940	1,023-1,236	1,640
Sept. 28	1,950	2,910	1,420	1,590
1988				
Aug. 23			1,188	1,989
Aug. 27			1,270	1,764
Aug. 28			1,234	1,918

* Note: GS gauge readings are ± 200 ft^3/s.

An Ikigami video camera attached to the front of a helicopter on a Tylor mount was used to obtain the video. The camera was connected to a monitor viewed by a flight scientist in the helicopter and another monitor viewed by the pilot. This allowed the helicopter pilot to maintain the river in the center of the video image. The flight scientist also annotated the video tape with audio information about backwaters, side channels, general water turbidity, and weather conditions as they appeared visually from the helicopter. This function served as a "ground truthing" effort which assisted the video interpreter in identifying river features on the video monitor in the laboratory.

The video images were analyzed on a 386 microcomputer system which included a video capture board and two color monitors. Analysis was performed with MIPS (Map and Image Processing System) software. Video images were viewed on the color monitors and captured in continuous overlapping frames along the entire length of the four study sites. The video image was viewed repeatedly until the computer operator was confident if backwaters or side channels were present and what their boundaries were. The video frame capturing monitor and a second high resolution monitor were used to delineate habitats and to more accurately locate the streambank for measurement of channel width. The audio portion of the tape was listened to at this time to assist the computer operator in interpreting the video image.

Video scale was calculated by measuring the length of highway bridges measured on the ground at six locations within the four study reaches. River-mile segments and the bridges used for their respective calibration were as follows:

Green River		Colorado River	
0–102	Moab bridge	0–77	Moab bridge
103–120	Green River bridge	78–94	Dewey bridge
200–244	Green River bridge	95–110	Fruita bridge
245–298	Ouray bridge	140–170	Fruita bridge
299–317	Jensen bridge		

Different bridges were used to calibrate various river segments to adjust for the changing elevation of the rivers. The video was acquired at 2,000 feet above mean terrain and adjustments to compensate for the changing river elevation were made at the Dewey and Jensen bridges.

To calibrate the video, a frame containing each bridge was captured and saved. The ends of the bridge were delineated with an algorithm caliper. The corresponding ground measurement was then entered, and the calibrated cell length and area was calculated. At the beginning of each work session, the appropriate bridge calibration for the section of river being analyzed was loaded, and all frames were calibrated with those cell sizes. When changing to a new section of river, the next appropriate bridge with the new cell size was loaded, and all frames were calibrated accordingly. (Note: At 2,000 feet above the river, the cell size is 2 m^2).

Video frames were captured and a river-mile location to the nearest tenth mile was determined using the GS 7.5-minute quadrangle maps with calculated river-mile designations. Channel width was measured perpendicular to the flow of the river at the center of each frame on the video monitor using a cursor controlled by a mouse or a digitizing puck with calipers. Channel width was defined to include the distance from one bank to the other excluding vegetated islands. Channel width was measured in the center of each frame to avoid biasing the data. A total of 989 and 599 cross sections were measured on the Green and Colorado Rivers, respectively. Backwater and side channel outlines (polygons) were delineated on the video monitor. Each feature was labeled on the screen, and the corresponding measurement was saved in a text file.

The channel width label format was a CW followed by the river-mile, followed by a dash, followed by the nearest tenth of a mile. The label CW033-5 indicates a channel width for river-mile 33.5. The label format for backwaters was an uppercase B followed by either a lowercase t, b, or "-" to indicate a top (upstream), bottom (downstream), or side opening on the sand or cobble bar, followed by either a lowercase b or c to indicate bank or mid-channel location, and ending with a number identifying each backwater occurring in that frame. The following types of backwaters were therefore possible:

Bbb# — bottom opening bank location
Btb# — top opening bank location
B-b# — side opening bank location
Bbc# — bottom opening channel location
Btc# — top opening channel location
B-c# — side opening channel location

Side channels were labeled with SC followed by a number indicating each side channel occurring in that frame. A backwater or side channel label followed by a "-#" indicates that a single

backwater or side channel occurs in more than one frame and that the measurements need to be added together. The number following the dash indicates the tenth of a mile in which that portion occurred.

After each video frame was captured, two copies were saved, one for analysis and the other for future modification. One copy was then annotated with the channel width and any backwater or side channel outlines. This annotated version and the original or unlabeled image were then saved in one RVF (raster-vector file). The file was labeled with the nearest tenth river-mile and preceded by a C for Colorado River or G for Green River. Also included in the label were the number of the frame within each river-mile, the video tape number, the tape counter number, and the date of video acquisition. As an example, the following is a list of all frames for Colorado River mile 110:

C110-8 F1T5TC1447-09/26/89 — Colorado River, mile 110.8, frame 1, tape 5, tape counter 1447
C110-6 F2T5TC1504-09/26/89
C110-4 F3T5TC1517-09/26/89
C110-2 F4T5TC1538-09/26/89
C110-0 F5T5TC1548-09/26/89

This procedure was implemented to allow for easy retrieval of source material for all data obtained in the study. All RVF files were stored on double-sided, high-density floppy diskettes. Data were stored in four text files corresponding to the four monitoring reaches (two on the Colorado River and two on the Green River). All data are presented in appendix A. All subsequent ISMP river habitat data will be stored on erasable optical disks.

Upon completion of the video analysis, the text files containing the numerical data were transferred directly into Lotus 1-2-3 version 2.01 using the file, import, data, parse sequence of commands. The data were separated into channel width and backwater and side channel area. The four monitoring reaches were broken down into smaller sections (20 miles, where possible) for comparative analysis as follows:

Colorado River		Green River	
Lower reach	Upper reach	Lower reach	Upper reach
0–20	140–170	0–15	200–215
21–40		16–35	216–235
41–60		36–55	236–255
61–80		56–75	256–275
81–100		76–95	276–295
101–110		96–115	295–315
		116–120	316–317

Locations of the lower and upper monitoring reaches of the Green and Colorado Rivers are illustrated on figure 1, Location Map.

The Green River was segmented into sections that corresponded as closely as possible to those from the 1988 study (Pucherelli and Clark, 1989) to allow for direct comparison of results. Data are reported in tabular form for the upper and lower reaches of the Green and Colorado Rivers and include average channel width (meters) and standard deviation; number of backwaters, number of

backwaters/mile, backwater area (m^2), backwater area/mile,average backwater size and standard deviation; and number of side channels, number of side channels/mile, side channel area, side channel area/mile, and average side channel size.

The Green River was video taped from its confluence with the Colorado to its confluence with the Yampa, in September 1988 to acquire low-flow baseline backwater information (Pucherelli and Clark, 1989). The lower and upper monitoring reaches were extracted from the 1988 data and compared with the 1989 backwater data.

RESULTS

Green River

Backwater characteristics for the upper and lower monitoring reaches of the Green River are presented in table 1. The lower reach (river-miles 0 to 120) contained 116 backwaters or approximately 1 backwater/mile. The number of backwaters/mile was somewhat consistent ranging from 0.8 to 1.4 within the 20-mile segments. Total backwater area was 68,457 m^2 or 570 m^2/mile with an average backwater size of 590 m^2. Backwater area/mile within the 20-mile segments ranged from 285 to 864 m^2/mile. Backwater number in the upper reach (river-miles 200 to 317) averaged 3.4/mile with a total area of 280,632 m^2 or 2,378 m^2/mile. Average backwater size was 690 m^2. Backwaters/mile within the upper reach ranged from 2.0 to 4.8, while area/mile ranged from 1,600 to 3,579 m^2. Table 2 presents the side channel characteristics for the lower and upper monitoring reaches of the Green River. The lower reach contained only 24 side channels or 0.2/mile with an area of 180,646 m^2. The average side channel size was 7,527 m^2. The upper reach contained 118 side channels or 1.0/mile. Total area was 992,146 m^2 or 8,408 m^2/mile with an average size of 8,408 m^2.

Average channel width for the lower reach was 137 meters and ranged from 123 to 155 meters among the 20-mile segments (table 3). The upper reach was considerably wider, averaging 216 meters. Average channel width for the entire Green River study area was 178 meters.

Colorado River

Backwater characteristics for the lower and upper monitoring reaches of the Colorado River are presented in table 4. The lower reach (river-miles 0 to 110) had 170 backwaters, averaging 1.5/mile. Backwaters/mile ranged from 1.2 to 2.2. Area/mile was 1,234 m^2 with an average backwater size of 798 m^2. Area/mile ranged from as little as 307 m^2 for river-miles 61 to 80, to 2,627 m^2 for river-miles 41-60. The upper monitoring reach (river-miles 140 to 170) had an average of 2.6 backwaters/mile. The area/mile was 2,137 m^2, and the average backwater size was 822 m^2.

Table 5 gives the side channel characteristics for the Colorado River. The lower reach averaged 0.3 side channel/mile with a total area of 264,906 m^2. Side channel area/mile averaged 2,408 m^2 and ranged from 444 m^2 for river-miles 0 to 20 to 4,886 m^2 for river-miles 81 to 100. The upper reach averaged 0.8 side channel/mile. Area/mile was 12,337 m^2 with an average size of 7,358 m^2.

Average channel width for the lower reach of the Colorado River was 153 meters, ranging from 122 meters for river-miles 81 to 100 to 194 meters for river-miles 41 to 60 (table 6). The upper

reach (river-miles 140 to 170) averaged 175 meters. The average channel width for the entire Colorado River study area was 158 meters.

DISCUSSION

Channel Width - Green River

As expected from previous studies, average channel width for the lower monitoring reach of the Green River was substantially narrower than the upper reach (table 3), averaging about 37 percent less (lower reach = 137 meters, upper reach = 216 meters). These results are comparable with previous studies. Andrews (1986) reported the average channel width from Jensen to Ouray as 186 meters, based on only 15 cross section measurements of the Green River on large-scale aerial photographs. This number is approximately 7 percent less than the average width of about 200 meters for roughly the same reach in this study, based on 236 cross section measurements on video. The discrepancy may be related to a number of factors, but it is probably chiefly due to the dates of data collection. Andrews'photographs were acquired in 1978, and our video was acquired in 1989. The high flood years of 1983 and 1984 widened the channel width from about 1 to 5 percent on various reaches below the Jensen gauge (Pucherelli et al., 1987) and this would be reflected in the video data. Secondly, this study was based on considerably more cross sections than Andrews' which presumably produced a more accurate channel width measurement. Lastly, Andrews' measurements were derived from aerial photographs, and our data were derived from aerial video.

Andrews' reported a channel width of 142 meters for a 15-mile reach below the GS Green River, Utah, gauge. This measurement was based on only 14 cross sections and is about 6 percent less than our measurement of 151 meters for a similar reach based on 99 cross sections. This difference in channel width is similar to that for the upper reach and was affected by the same study variables listed above.

Pucherelli et al. (1987, 1988) determined channel width for portions of the upper and lower monitoring reaches. They reported a channel width of 205 meters for river-miles 237 to 310 (exclusive of river-miles 249 to 251), based on channel area calculations from 1986 aerial photography. Channel width in this study for river-miles 236 to 315 was approximately 206 meters. Pucherelli et al., (1988) reported a channel width of 140 meters for a portion of the lower monitoring reach from river-miles 94 to 121. The present study recorded a channel width of about 148 meters for river-miles 94 to 120, which is about 5 percent wider.

Sidle et al. (1989) noted that measuring channel width by cross-sectional methods may overestimate channel width. Although our channel width measurements are within range of previous investigators, they may be slightly overestimated if the cross section is slightly off perpendicular with respect to the channel. We believe that the large number of cross sections measured in the present study should remove most of the error. Regardless, by using consistent techniques, our video monitoring data will be comparable from year to year.

Channel Width - Colorado River

Channel width of the Colorado River was about 13 percent narrower for the lower reach than the upper reach (table 3). Presumably, the more braided nature of the upper reach accounts for this difference.

Green River Upper and Lower Monitoring Reaches - 1989

The upper monitoring reach of the Green River was generally wider (table 3) and had substantially more backwater and side channel numbers and area than the lower reach (tables 1, 2). Backwater number/mile in the upper reach was greatest from river-miles 236 to 295, while backwater area/mile was greatest from river-miles 236 to 275 (table 1). In the lower reach, backwater/mile was fairly consistent, but backwater area/mile was substantially greater for river miles 16-75 than other segments. River-miles 0 to 15 and 76 to 95 had the least backwater number and area/mile, and this trend was also reported for 1988 (Pucherelli and Clark, 1989). The upper reach was flown on 2 consecutive days and consequently, two different flows were video taped. Flow at the Jensen gauge increased from 1,023 to 1,236 ft^3/s on September 27 and increased again to 1,420 ft^3/s on September 28. Video taping was started at about the Ouray bridge on September 28 and, therefore, backwater number and area above this point may have been slightly effected, and were probably decreased somewhat from the previous day, if trends from previous studies are consistent (Pucherelli and Clark 1989). Channel width measurements are not effected by flow, as the bank full width is measured regardless of flow.

Side channel number and area/mile were about 80 percent less for the lower reach than the upper reach (table 2). The upper reach is generally more braided with more islands and associated sand bars.

Colorado River Upper and Lower Monitoring Reaches - 1989

The upper reach of the Colorado River is generally wider than the lower reach (table 6), with substantially more backwaters (table 4) and side channels (table 5). Although the lower reach had fewer and smaller backwaters (table 4), some segments had more backwater number and area/mile than others (river-miles 0 to 20, 41 to 60, and 101 to 110). Side channel area/mile was about 80 percent greater for the upper reach than the lower (table 5).

Green River 1988-1989 Backwater Comparisons

The Green River was video taped from its confluence with the Colorado to its confluence with the Yampa, in September 1988 to acquire low-flow baseline backwater information (Pucherelli and Clark, 1989). The lower and upper monitoring reaches were extracted from the 1988 data and compared with the 1989 backwater data in table 7. Flows at the GS Jensen gauge were slightly higher when the 1988 photography was acquired than for the 1989 (see flow table in methods) video dates, and this may effect any comparisons between the 2 years. However, we feel the flows were close enough to make some general observations.

There were substantially fewer backwaters recorded in 1989 for both reaches, but backwaters were larger in 1989 than 1988. Backwater number was reduced by 44 percent from 1988 to 1989, from 208 to 116 in the lower reach, but backwater area increased 12 percent from 60,924 to 68,457 m^2. The average size of a backwater more than doubled, increasing from 293 to 590 m^2. This may be a function of the low flows that occurred during 1989.

In the upper reach, backwater number decreased by 34 percent in 1989 from 567 to 376. Backwater area increased 16 percent from 212,893 to 247,635 m^2 and the average backwater size increased from 375 to 659 m^2. Figures 2 and 3 represent a video image of river-mile 254 (Ouray site) from

1989 and an aerial photograph of the same area during 1988, respectively. Flows at the Jensen gauge were similar for both dates although slightly higher in 1988. These figures illustrate how sandbar configuration may change from year to year as well as presenting a good example of the more numerous, smaller backwaters of 1988 compared to fewer, larger backwaters during 1989. The difference in flows may account for the disparity shown; however, the 1988 photograph shows larger sandbars at a higher flow. If the sandbar configuration were the same, smaller sandbars would be expected at higher flows, as opposed to the larger sandbars seen in figure 2.

Comparison of the upper and lower reaches of the Green River from previous studies have shown similar trends, with fewer and smaller backwaters occurring in the lower reaches of the Green River than in the upper reaches (Pucherelli et al., 1988; Pucherelli and Clark, 1989). Backwater area/mile in the lower reach averaged only 570 m^2 in 1989, while the upper reach averaged 2,501 m^2/mile. Similarly, in 1988, backwater area/mile in the lower reach averaged only 508 m^2 while the upper reach averaged 2,150 m^2/mile.

Correlation of Video Monitoring and Catch Data

An objective of this study was to correlate the river habitat data with the CPUE data collected by the participating agencies. Valuable information will be compiled to assist managers and researchers in facilitation the recovery of the endangered fish in the upper Colorado River Basin. Although several years of data will be required to determine if habitat information correlates well with fish sampling data, we believe that correlation of the 1989 habitat and CPUE data will be useful in refining techniques related to the ongoing ISMP.

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Table 1. - Backwater characteristics for the upper and lower reaches of the Green River, 1989 ISMP, September 27 and 28, 1989 (flow at GS Jensen gauge = 1,023-1,420 ft^3/s; flow at GS Green River, Utah, gauge = 1,590-1,660 ft^3/s)

River-mile	Backwaters	Backwaters/ mile	Area (m^2)	Area/mile (m^2)	Mean size (m^2)	S*
Lower reach						
0–15	12	0.8	4,278	285	357	524
16–35	19	1.0	12,412	621	653	1,043
36–55	23	1.2	17,272	864	751	1,063
56–75	24	1.2	16,588	829	691	867
76–95	15	0.8	5,175	259	345	455
96–115	16	0.8	10,449	522	653	832
116–120	7	1.4	2,284	457	326	366
Total reach (0–120)	116	1.0	68,457	570	590	866
Upper reach						
200–215	30	2.0	32,986	12,199	1,100	2,521
216–235	56	2.8	46,110	2,306	823	1,299
236–255	81	4.0	71,589	3,579	884	1,765
256–275	93	4.6	55,893	2,795	601	1,245
276–295	95	4.8	42,035	2,102	442	624
296–315	51	2.6	32,008	1,600	628	1,242
316–317	1	1.0	12			
Total reach (200–317)	407	3.4	280,632	2,378	690	1,414

* Standard deviation.

Table 2. - Side channel characteristics for the upper and lower reaches of the Green River, 1989 ISMP, September 27 and 28, 1989 (flow at GS Jensen gauge = 1,023-1,420 ft^3/s; flow at GS Green River, Utah gauge = 1,590-1,660 ft^3/s)

River-mile	Channel No.	Side channel/ mile	Area (m^2)	Area/mile (m^2)	Mean size (m^2)
Lower reach					
0–15	4	0.3	4,104	274	1,026
16–35	2	0.1	4,727	236	2,364
36–55	2	0.1	11,248	562	5,624
56–75	1	<0.1	6,381	319	6,381
76–95	3	0.2	34,057	1,703	11,352
96–115	11	0.6	116,520	5,826	10,593
116–120	2	0.4	9,088	1,818	4,544
Total reach (0–120)	24	0.2	180,646	1,505	7,527
Upper reach					
200–215	8	0.5	91,629	4,581	11,454
216–235	15	0.8	202,723	10,136	13,515
236–255	27	1.4	193,956	9,698	7,184
256–275	28	1.4	172,817	8,641	6,172
276–295	25	1.2	199,109	9,955	7,964
296–315	15	0.8	131,914	6,596	8,794
316–317	0	0.0			
Total reach (200–317)	118	1.0	992,146	8,408	8,408

Table 3. - Average channel width for the lower and upper reaches of the Green River for the ISMP September 27 and 28, 1989 (flow at GS Jensen gauge = 1,023-1,420 ft^3/s; flow at GS Green River, Utah gauge = 1,590-1,660 ft^3/s).

River-miles	Average channel width (m)	S*	No. of transects
Lower reach			
0–15	123	23	60
16–35	130	40	81
36–55	142	58	79
56–75	139	35	77
76–95	132	36	79
96–115	150	33	79
116–120	155	57	20
Total reach (0–120)	137	41	475
Upper reach			
200–215	228	87	83
216–235	241	129	104
236–255	201	88	86
256–275	220	102	80
276–295	236	58	82
296–315	163	54	74
316–317	116	39	5
Total reach (200–317)	216	96	514

* Standard deviation

Table 4. - Backwater characteristics for the upper and lower reaches of the Colorado River, 1989 ISMP, September 26, 1989 (flow at GS State Line gauge = 2,990 ft^3/s).

River-mile	Backwaters	Backwaters/ mile	Area (m^2)	Area/mile (m^2)	Mean size (m^2)	S*
Lower reach						
0–20	30	1.5	31,840	1,592	1,061	1,601
21–40	27	1.4	15,736	787	583	578
41–60	38	1.9	52,531	2,627	1,382	3,046
61–80	23	1.2	6,142	307	267	346
81–100	30	1.5	18,012	901	600	743
101–110	16	2.2	11,508	1,144	520	635
Total reach (0–120)	170	1.5	135,699	1,234	798	1,700
Upper reach						
140–170	78	2.6	64,120	2,137	822	1,112

* Standard deviation.

Table 5. - Side channel characteristics for the upper and lower reaches of the Colorado River, 1989 ISMP, September 26, 1989 (flow at GS State Line gauge = 2,990 ft^3/s)

River-mile	Channel No.	Side channel/ mile	Area (m^2)	Area/mile (m^2)	Mean size (m^2)
Lower reach					
0–20	4	0.2	8,882	444	2,220
21–40	7	0.4	61,152	3,058	8,736
41–60	4	0.2	26,164	1,308	6,541
61–80	5	0.2	38,932	1,947	7,786
81–100	8	0.4	97,729	4,886	12,216
101–110	8	0.8	32,046	3,205	4,006
Total reach (0–110)	36	0.3	264,906	2,408	7,358
Upper reach					
140–170	25	0.8	370,118	12,337	14,805

Table 6. - Average channel width for the lower and upper reaches of the Colorado River for the ISMP, September 26, 1989 (flow at GS State Line gauge = 2,990 ft^3/s)

River-miles	Average channel width (m)	S*	No. of transects
Lower reach			
0–20	146	36	83
21–40	176	50	82
41–60	194	50	85
61–80	138	66	84
81–100	122	50	81
101–110	153	57	42
Total reach (0–110)	153	57	457
Upper reach			
140–170	175	88	142

* Standard deviation

Table 7. - Comparison of backwater number and area between 1988 (August 23, 27 and 28, flow at Jensen gauge = 1,188–1,270 ft^3/s, flow at Green River, Utah = 1,764–1,989 $ft^3/$); and 1989 (September flow at GS Jensen gauge = 1,023–1,420 ft^3/s; flow at GS Green River, Utah gauge = 1,590–1,660 ft^3/s) for the upper and lower reaches of the Green River

River-mile (m^2)	Backwaters		Area (m^2)		Average size	
	1988	1989	1988	1989	1988	1989
Lower reach						
0–15	22	12	2,589	4,276	118	357
16–35	36	19	10,753	12,412	299	653
36–55	40	23	12,987	17,272	325	751
56–75	44	24	13,275	16,588	302	691
76–95	19	15	4,022	5,175	212	345
96–115	47	16	17,298	10,449	368	653
Total reach 0–120	208	116	60,924	68,457	293	590
Upper reach						
216–235	56	56	29,137	46,110	520	823
236–255	85	81	31,188	71,589	367	884
256–275	101	93	41,746	55,893	413	601
276–315	154	51	33,221	32,008	216	628
296–315	154	51	33,221	32,008	216	628
Total reach (216–315)	567	376	212,893	247,635	375	659

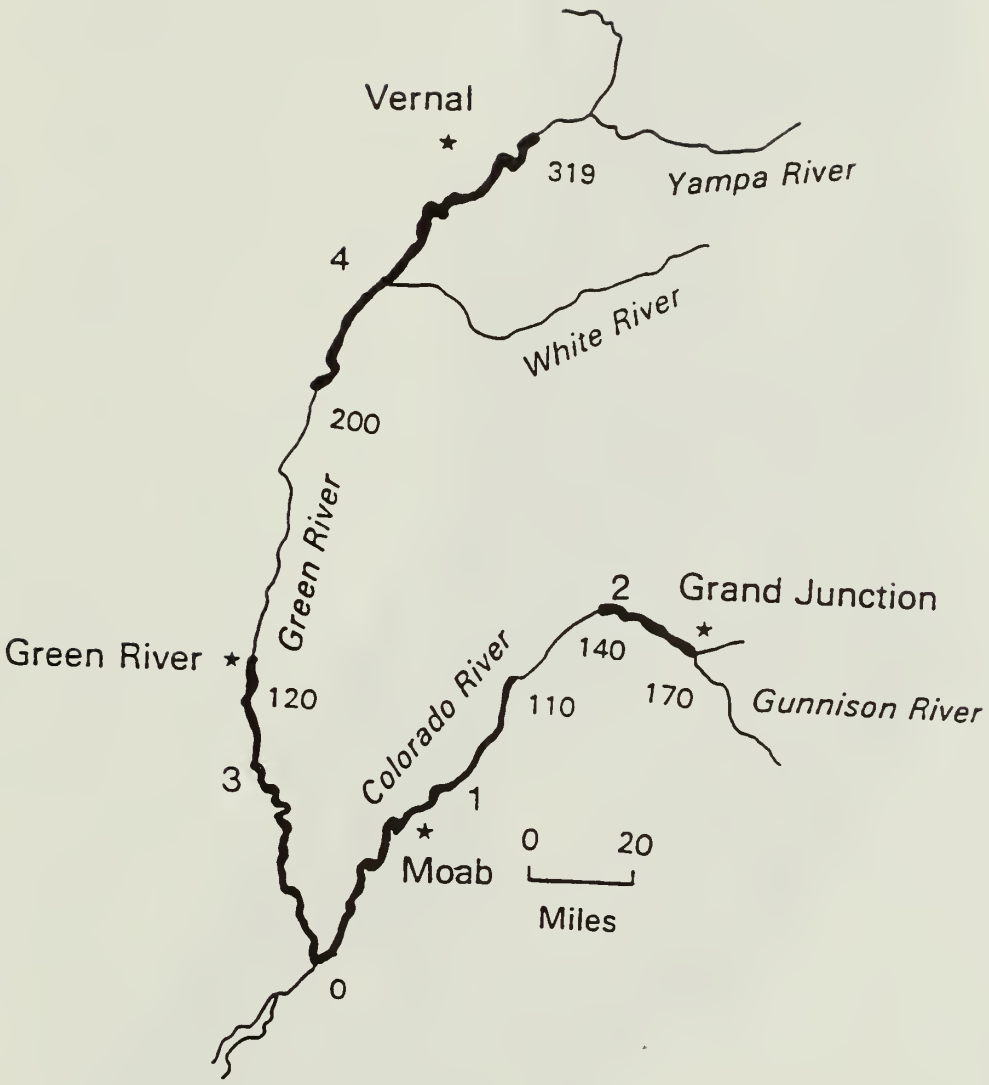

Figure 1. - Location map.

Figure 2. - 1989 video image - Green River mile 254 (Ouray). Average backwater size 4602 m^2. Total backwater area 9203 m^2.

Figure 3. - 1988 color infrared aerial photograph - Green River mile 254 (Ouray). Average backwater size 139 m^2. Total backwater area 835 m^2.

Appendix

Channel width, backwater, and side channel data

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW110-8	156		
CW110-6	109		
CW110-4	89		
CW110-2	155		
Btb1		1336	
CW110-0	173		
CW109-8	180		
Bbb1		1513	
CW109-6	154		
Bbb1		243	
CW109-2R	173		
Btb1		49	
SC1			1116
SC2-2R			2828
CW109-2L			
Btb1		622	
SC1			662
SC2			1568
CW109-0	133		
SC1-0			
Bbc1		29	
CW108-8	96		
Bbb1		65	
CW108-6	175		
CW108-4	73		
CW108-0	296		
CW107-8	109		
Bbb1		65	
CW107-6	96		
Btb1		1342	
CW107-4	78		
Bbb1		69	
CW107-2	108		
CW107-0	90		
CW106-7	115		
Bbb1		154	
CW106-5	104		
Bbb1		160	
SC1			4231
CW106-2	84		
CW106-0	115		
Btb1		2344	
SC1			3679
CW105-7	187		
Bbb1		540	
Bbb2		973	
CW105-4	103		
Bbb1		163	

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
SC1			6054
CW105-0	80		
CW104-8	125		
CW104-5	110		
Btb1		232	
CW104-2	151		
Bbb1		1066	
CW104-0	199		
B-c1		79	
SC1-0			11907
CW103-8	91		
SC1-8			
Bbc1		50	
CW103-5	149		
CW103-2	91		
CW103-0	125		
Btb1		233	
Btb2		92	
CW102-8	72		
CW102-6	132		
Btb1		88	
CW102-4	160		
CW102-2	151		
CW102-0	68		
CW101-5	68		
CW101-8	100		
CW101-3	119		
CW101-0	94		
	AVG CW	AVG BW	AVG SC
	125	500	4006
STD	44	614	3421
COUNT	42	23	8
TOT. AREA		11508	32046
CW100-7	122		
CW100-4	163		
CW100-0	172		
Btb1		1344	
Bbb2		39	
Bbb3		1627	
CW099-8	114		
CW099-5	118		
SC1-5			9888
SC2-5			18590
CW099-3	209		
SC1-3			
SC2-3			
B-b1		171	

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW099-0	173		
Bbb1		945	
Bbb2		1788	
SC1-0			
CW098-8	128		
SC1-8			
CW098-6	84		
CW098-3	80		
SC1-3			10771
CW098-0	126		
SC1-0			
CW097-7	181		
SC1-7			
CW097-5	113		
CW097-2	167		
SC1-2			20291
CW097-0	181		
SC1-0			
CW096-7	167		
SC1-7			
Btb1		26	
Bbb2		84	
CW096-4	68		
CW096-2	217		
SC1			10282
CW096-0	144		
Bbb1		2074	
CW095-8	95		
CW095-5	107		
CW095-3	124		
CW095-0	113		
CW094-8	99		
CW094-6	113		
CW094-3	96		
CW094-0	117		
CW093-8	136		
Bbb1		1236	
CW093-6	141		
CW093-4	115		
CW093-2	150		
CW093-0	70		
Btb1		80	
B-b2		689	
CW092-7	109		
CW092-5	82		
CW092-2	123		
SC1-2			13030
CW092-0	140		

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
SC1-0			
Bbb1		446	
CW091-8	121		
CW091-6	122		
CW091-3	131		
CW091-0	91		
Bbb1		65	
CW090-7	91		
CW090-5	108		
CW090-2	82		
CW090-0	108		
CW089-8	83		
CW089-5	78		
CW089-3	75		
CW089-0	122		
CW088-7	97		
CW088-5	70		
CW088-3	57		
CW088-0	165		
CW087-7	72		
CW087-5	140		
CW087-0	124		
CW086-8	100		
CW086-6	75		
CW086-3	104		
CW086-0	106		
CW085-8	91		
CW085-6	92		
Bbb1		22	
Btb2		40	
CW085-3	49		
CW085-1	80		
CW084-8	120		
CW084-6	100		
Bbb1		59	
Bbb2		348	
CW084-4	149		
CW084-2	90		
CW084-0	63		
CW083-7	348		
Bbb1		3932	
B-c2		104	
SC1			2772
CW083-5	317		
SC1-5			12104
Bbc1		32	
CW083-3	107		
SC1-3			

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW083-0	143		
Bbb1		66	
Btb2		236	
CW082-8	93		
CW082-6	87		
CW082-4	254		
CW082-2	128		
Bbb1		419	
Btb2		2024	
Bbb3		90	
CW082-0	135		
Bbb1		1407	
CW081-8	97		
CW081-6	128		
CW081-3	89		
Btb1		49	
Bbb2		76	
CW081-0	133		
Btb1		134	
	AVG CW	AVG BW	AVG SC
	122	655	12216
STD	50	898	5086
COUNT	81	30	8
TOT. AREA		19653	97729
CW080-8	111		
CW080-6	147		
CW080-3	83		
CW080-0	129		
Bbb1		106	
Btb2		77	
CW079-8	95		
CW079-6	105		
CW079-3	146		
SC1			1709
CW079-0	103		
CW078-8	115		
CW078-6	83		
CW078-3	85		
CW078-0	90		
CW077-8	111		
CW077-6	83		
B-b1		104	
CW077-3	87		
CW077-0	67		
Bbb1		52	
CW076-8	56		
CW076-6	84		

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
B-b1		25	
CW076-2	80		
CW076-0	114		
CW075-7	67		
CW075-6	190		
CW075-3	59		
Bbb1		1140	
CW075-0	58		
CW074-8	55		
Bbb1		23	
CW074-6	92		
CW074-3	88		
CW074-0	70		
CW073-8	70		
B-b1		156	
CW073-6	80		
CW073-3	135		
Bbb1		217	
CW073-2	105		
SC1			3143
CW073-0	101		
CW072-8	84		
CW072-5	127		
B-b1		38	
CW072-2	64		
CW072-0	99		
CW071-8	102		
CW071-6	83		
CW071-3	88		
B-b1		231	
CW071-0	80		
Btb1		20	
CW070-8	121		
CW070-6	103		
CW070-3	64		
CW070-0	80		
CW069-8	82		
CW069-5	101		
CW069-2	123		
CW069-0	180		
CW068-8	165		
CW068-6	174		
CW068-4	172		
CW068-2	150		
CW068-0	184		
Bbb1		695	
CW067-8	182		
CW067-6	200		

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
SC1			6088
CW067-3	115		
CW067-0	130		
CW066-8	153		
CW066-6	165		
CW066-4	141		
CW066-2	137		
CW066-0	170		
CW065-7	176		
Bbb1		43	
CW065-5	143		
CW065-3	110		
CW065-0	173		
CW064-8	130		
CW064-6	225		
Btb1		39	
SC1-6			23748
CW064-4	201		
Btc1		793	
SC1-4			
CW064-0	194		
SC1-0			
CW063-8	338		
CW063-6	363		
SC1			4244
CW063-3	269		
CW063-0	279		
CW062-8	149		
CW062-6	206		
CW062-3	281		
Bbc1		195	
Btb2		723	
CW062-0	293		
CW061-8	159		
CW061-6	188		
CW061-4	201		
B-b1		93	
B-b2		38	
CW061-2	239		
CW061-0	276		
Btc1		138	
Bbc2		93	
Bbc3		1104	
	AVG CW	AVG BW	AVG SC
	138	267	7786
STD	66	346	8108
COUNT	84	23	5
TOT. AREA		6142	38932

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW060-8	222		
CW060-6	217		
CW060-3	230		
Bbc1		54	
Bbc2		43	
CW060-0	201		
Bbc1		281	
Bbc2		48	
SC1			727
CW059-8	188		
CW059-6	177		
CW059-3	212		
CW059-0	232		
Bbc1		1251	
Btb2		365	
CW058-8	209		
CW058-6	161		
CW058-4	162		
CW058-1	121		
CW057-9	218		
Bbc1		95	
CW057-7	226		
Bbc1		115	
SC1			7710
CW057-4	189		
CW057-0	158		
Bbb1		3308	
CW056-8	151		
CW056-6	193		
CW056-3	221		
Bbb1		36	
CW056-0	226		
CW055-8	190		
SC1		1085	
CW055-6	224		
Bbc1		585	
CW055-2	247		
CW055-0	255		
Bbc1		2493	
CW054-8	255		
CW054-6	291		
SC1-6			10156
CW054-4	281		
Bbc1		492	
SC1-4			
CW054-2	188		
SC1-2			

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
Bbb1		322	
CW054-0	127		
CW053-8	113		
Bbb1		27	
CW053-6	150		
CW053-4	193		
CW053-2	209		
Bbb1		29	
CW053-0	225		
CW052-8	150		
CW052-6	134		
CW052-3	151		
CW052-0	176		
CW051-8	267		
Bbb1		272	
Bbb2		349	
CW051-5	243		
Bbb1		73	
CW051-3	94		
CW051-0	189		
CW050-8	186		
CW050-5	114		
Bbb1		705	
CW050-2	161		
CW050-0	261		
CW049-7	226		
Bbc1		995	
CW049-5	220		
Bbb1		394	
CW049-3	277		
Bbb1		797	
Bbc2		344	
CW049-0	190		
Bbc1		671	
CW048-8	315		
Bbc1		668	
CW048-6	235		
Bbc1		143	
CW048-4	122		
CW048-0	169		
Bbb1		122	
CW047-8	106		
CW047-6	141		
CW047-4	135		
CW047-0	145		
Bbb1		211	
CW046-8	127		
CW046-6	151		

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
Bbb1		188	
CW046-4	163		
CW046-2	188		
CW046-0	180		
Bbb1		1747	
CW045-7	269		
CW045-5	217		
Bbb1		13065	
CW045-2	130		
CW045-0	159		
CW044-8	169		
CW044-6	230		
Bbc1		464	
CW044-4	157		
CW044-0	157		
CW043-8	193		
CW043-6	229		
CW043-5	279		
Bbb1		14034	
CW043-3	268		
Bbb1		659	
CW043-0	315		
SC1			7572
Bbc1		621	
CW042-8	224		
CW042-6	166		
CW042-4	141		
CW042-2	181		
CW042-0	135		
CW041-8	139		
CW041-6	205		
CW041-3	218		
CW041-0	245		
Bbb1		5381	
	AVG CW	AVG BW	AVG SC
	194	1382	6541
STD	50	3046	3511
COUNT	85	38	4
TOT. AREA		52531	26164
CW040-7	95		
CW040-4	173		
CW040-2	216		
Bbc1		218	
Bbc2		47	
SC1			3276
CW040-0	161		
CW039-8	138		

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW039-5	155		
CW039-2	123		
CW039-0	173		
CW038-8	141		
Bbc1		27	
CW038-6	111		
CW038-4	177		
CW038-0	145		
CW037-8	145		
SC1			238
CW037-5	168		
CW037-3	117		
CW037-0	141		
CW036-8	186		
CW036-6	237		
CW036-5	244		
Bbc1		2177	
SC1-5			20451
CW036-3	228		
Bbb1		745	
SC1-3			
CW036-0	91		
CW035-8	129		
CW035-6	110		
Bbb1		1351	
CW035-3	173		
CW035-0	226		
CW034-8	145		
CW034-6	126		
Bbb1		55	
CW034-4	168		
CW034-2	202		
CW034-0	281		
Bbb1		637	
CW033-7	193		
CW033-4	272		
SC1			12768
CW033-2	239		
Btb1		294	
SC1-2			10305
CW033-0	249		
Bbc1		637	
Bbc2		120	
SC1-0			
CW032-8	285		
CW032-7	244		
CW032-5	127		
CW032-0	138		

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW031-8	189		
CW031-6	265		
Bbb1		1253	
Bbc2		39	
SC1			3961
CW031-4	206		
SC1-4			10153
CW031-2	208		
SC1-2			
CW031-0	134		
CW030-7	119		
CW030-5	176		
CW030-3	149		
CW030-0	106		
CW029-7	193		
CW029-5	190		
CW029-3	131		
Bbb1		405	
CW029-0	151		
CW028-7	186		
CW028-5	237		
Bbc1		208	
CW028-3	224		
CW028-0	135		
CW027-8	208		
CW027-5	264		
Bbc1		494	
CW027-3	206		
CW027-0	181		
CW026-8	121		
CW026-6	188		
CW026-4	299		
Bbc1		129	
CW026-0	276		
B-b1		1418	
Bbb2		1747	
CW025-8	178		
CW025-5	117		
CW025-3	138		
CW025-0	197		
Bbc1		64	
Bbb2		324	
CW024-7	146		
Bbb1		1137	
CW024-5	101		
CW024-2	154		
Btb1		116	
Bbc2		120	

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW023-8	177		
CW023-6	119		
CW023-3	139		
CW023-0	188		
CW022-8	184		
CW022-6	153		
CW022-3	173		
Bbb1		1076	
CW022-0	143		
CW021-8	127		
CW021-6	181		
Bbb1		465	
CW021-3	235		
Bbc1		433	
CW021-0	184		
	AVG CW	AVG BW	AVG SC
	176	583	8736
STD	50	578	6356
COUNT	82	27	7
TOT. AREA		15736	61152
CW020-8	198		
Bbc1		18	
CW020-6	177		
CW020-4	265		
Bbc1		356	
CW020-0	221		
CW019-8	181		
CW019-6	239		
Bbc1		3908	
SC1			4778
SC2			2511
CW019-4	161		
B-b1		675	
CW019-0	131		
CW018-9	111		
CW018-7	142		
CW018-4	169		
Bbc1	202	2243	
CW018-2	206		
Bbc1		2159	
CW018-0	157		
CW017-7	122		
Bbb1		199	
CW017-4	210		
Bbb1		4248	
SC1			1334
SC2			260

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
CW017-2	123		
CW017-0	126		
Bbb1		242	
CW016-7	135		
CW016-4	137		
CW016-2	163		
Btb1		585	
CW016-0	145		
Bbb1		1828	
CW015-7	114		
CW015-4	158		
Bbb1		183	
CW015-2	224		
CW015-0	213		
Bbc1		93	
CW014-8	170		
CW014-6	177		
CW014-2	213		
CW014-0	169		
CW013-7	141		
CW013-5	190		
CW013-0	126		
Bbb1		324	
CW012-7	127		
CW012-5	115		
CW012-3	118		
CW012-0	118		
CW011-8	123		
CW011-5	119		
CW011-3	159		
CW011-0	214		
Bbc1		784	
Bbc2		211	
CW010-8	196		
Bbc1		319	
CW010-6	142		
Bbc1		127	
CW010-4	161		
Bbc1		306	
CW010-3	138		
CW010-0	130		
CW009-8	125		
CW009-6	118		
CW009-3	129		
CW009-0	121		
CW008-7	131		
Bbb1		163	
CW008-5	143		

COLORADO RIVER - MONITORING AREA #1

RIVER MI	CW	BW	SC
Bbc1		585	
CW008-3	141		
CW008-0	119		
CW007-8	129		
CW007-6	125		
CW007-3	105		
CW007-0	99		
CW006-8	95		
Bbb1		147	
CW006-5	98		
CW006-3	96		
CW006-0	130		
Bbb1		23	
CW005-9	95		
CW005-6	137		
CW005-4	165		
Bbb1		168	
CW005-2	151		
CW005-0	146		
CW004-7	138		
Bbb1		1679	
CW004-5	145		
Bbb1		362	
CW004-3	165		
Bbb1		7541	
CW004-0	119		
CW003-8	149		
Bbb1		424	
CW003-5	109		
CW003-3	146		
CW003-0	121		
CW002-8	103		
CW002-5	123		
B-b1		1038	
CW002-2	117		
CW002-0	130		
CW001-8	137		
SC1		903	
CW001-6	98		
CW001-3	126		
CW001-0	155		
	AVG CW	AVG BW	AVG SC
	146	1061	2220
STD	36	1601	1677
COUNT	83	30	4
TOT. AREA		31840	8882

COLORADO RIVER - MONITORING AREA #2

RIVER MI	CW	BW	SC
CW169.7	107		
SC1-7			4823
Bbb1		253	
CW169.5	115		
SC1-5			
CW169.2	200		
Btc1		249	
CW169.1	175		
SC1			917
CW168.8	202		
Bbc1		134	
Bbc2		50	
Bbc3		2483	
CW168.6	154		
Bbc1		50	
Bbb2		35	
CW168.5	137		
CW168.2	173		
SC1-2			71021
CW168.1	343		
SC1-1			
CW167.8	332		
SC1-8			
CW167.5	301		
SC1-5			
Bbc1		94	
Bbc2		36	
CW167.3	454		
SC1-3			
CW167-2	467		
SC1-2			
CW167-1	476		
SC1-1			
CW167-0	457		
SC1-0			
CW166.8	265		
SC1-8			
CW166-5	91		
SC1-5			
Bbc1		66	
CW166.3	185		
Bbb1		186	
CW166-0	137		
CW165-8	199		
CW165.5	298		
Bbb1-5		3254	
CW165-3	310		
Bbb1-3		3040	

COLORADO RIVER - MONITORING AREA #2

RIVER MI	CW	BW	SC
Bbb2		1008	
CW165-0	115		
Btb1		122	
CW164.8	138		
Bbb1		690	
CW164.5	121		
CW164.3	131		
CW163.9	372		
SC1-9			20442
B-b1		4326	
CW163.7	295		
SC1-7			
SC2			5939
Btc1		688	
CW163-5	161		
SC1			4886
Bbc1		75	
Bbc2		2307	
Bbc3		45	
CW163.3	247		
CW163.1	269		
CW163.0	79		
CW162.8	198		
Bbb1		184	
CW162-5	325		
B-b1		478	
B-c2		203	
SC1-5			7324
CW162-4	384		
SC1-4			
CW162-2	155		
B-b1		599	
CW162-0	173		
Bbb1		867	
SC1-0			21380
B-b2		1246	
CW161.8	148		
SC1-8			
B-c1		131	
CW161.5	209		
B-c1		523	
B-b2		436	
SC1-5			
Bbc3		1702	
Bbb4		78	
CW161-3	131		
CW161.2	108		
CW161.0	118		

COLORADO RIVER - MONITORING AREA #2

RIVER MI	CW	BW	SC
CW160.8	228		
B-c1		1557	
SC1-8			27348
CW160.6			
SC1-6			
Bbc1		88	
Bbc2		842	
CW160.5	257		
SC1-5			
RM160-4			
Btc1		446	
SC1-4			
CW160-2	263		
Btc1		135	
SC1-2			
RM160-1			
SC1-1			
CW160-7			
B-b1		2665	
B-b2		901	
CW160-5s			
B-c1		1240	
RM160-2s			
Bbb1		154	
Bbb2		59	
CW160-1S	354		
CW159.8	234		
CW159-6	119		
CW159.2	137		
Bbb1		3720	
SC1-2			17933
CW159-0	119		
CW158.7	270		
Bbb1		3266	
SC1-7			
CW158-5	162		
SC1-5			
CW158.2	174		
CW158.0	142		
CW157.9	151		
CW157.7	418		
B-c1		23	
Bbb2		14	
CW157.5	136		
Bbb1		65	
CW157.3	182		
CW157.1	132		
Bbb1		75	

COLORADO RIVER - MONITORING AREA #2

RIVER MI	CW	BW	SC
CW157.0	373		
SC1			5613
SC2			786
Bbc1		268	
CW156.8	355		
CW156.5	80		
CW156.3	161		
CW156-1	154		
Bbb1		337	
CW156-0	142		
Bbb1		156	
CW155-8	126		
CW155-6	131		
CW155-4	222		
Bbb1		3633	
CW155-2	115		
CW155.0	282		
SC1-0			12999
CW154.8	203		
SC1-8			
CW154-7	144		
SC1-7			
Bbb1		59	
CW154-3	140		
CW154.0	228		
RM154-9			
Btb1		533	
Bbb2		376	
SC1-9			65313
CW154-6			
B-b1		3720	
Bbb2		949	
SC1-6			
CW154-4			
Btb1		259	
Btb2		323	
SC1-4			
CW154-1			
SC1-1			
CW153-8	219		
SC1-8			
CW153.9			
Bbb1		3326	
Bbb2		1308	
SC1-9			
CW153.7	139		
Bbc1		33	
CW153.5	166		

COLORADO RIVER - MONITORING AREA #2

RIVER MI	CW	BW	SC
CW153.3	143		
Bbb1		2694	
CW153-0	167		
B-b1		163	
CW152-8	140		
SC1			3826
CW152-6	184		
CW152-4	79		
CW152-0	132		
CW152-2	150		
SC1			3908
CW151-7	120		
CW151-5	77		
CW151-4	89		
CW151-2	106		
CW151-0	146		
CW150-8	104		
CW150-5	258		
Bbc1		94	
Bbc2		194	
SC1-5			13112
CW150-4	136		
SC1-4			
CW150-2	82		
CW150-0	108		
CW149-8	125		
CW149-6	97		
CW149-4	116		
CW149-2	86		
CW149-0	71		
CW148-8	86		
CW148-6	97		
CW148-4	126		
CW148-2	146		
Btc1		403	
SC1			1136
CW148.0	130		
SC1-0			21592
Btc1		294	
CW147.8	146		
SC1-8			
Btb1		344	
CW147-6	152		
CW147-5	108		
CW147-3	144		
CW147.0	199		
CW146-9	109		
Bbb1		1493	

COLORADO RIVER - MONITORING AREA #2

RIVER MI	CW	BW	SC
CW146-6	106		
B-b1		154	
CW146-4	184		
SC1			12648
CW146-2	70		
SC1			3871
CW146-0	116		
CW145.9	148		
CW145.7	122		
CW145-3	92		
CW145-0	121		
CW144-8	144		
CW144.5	133		
CW144-3	133		
Bbb1		207	
CW144-0	157		
CW143-8	112		
Bbb1		174	
CW143.6	154		
SC1			2190
SC2-6			11877
CW143-4	146		
SC1-4			
CW143-2	79		
CW143-0	132		
CW142.8	138		
Btb1		79	
CW142-6	152		
Bbb1		32	
CW142-4	130		
Btc1		265	
SC1-4			6963
CW142.2	161		
SC1L-2			
SC2R-2			22271
CW142.0	163		
SC1-0			
CW141-8	226		
SC1-8			
Btb1		91	
CW141-6	206		
SC1-6			
CW141-4	122		
CW141-2	127		
Bbb1		1272	
CW141.0	121		
CW140.8	119		
CW140.6	109		

COLORADO RIVER - MONITORING AREA #2

RIVER MI	CW	BW	SC
CW140-4	161		
CW140-2	100		
CW140.0	161		
	AVG CW	AVG BW	AVG SC
	175	822	14805
STD	88	1112	17490
COUNT	142	78	25
TOT. AREA		64120	370118

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW001-0	96		
CW001-4	111		
CW001-6	107		
CW001-8	92		
CW002-0	117		
SC1			1434
CW002-2	137		
CW002-5	131		
SC1			1283
CW002-8	145		
Btb1		63	
CW002-9	102		
CW003-0	111		
CW003-5	88		
CW003-6	114		
CW003-8	101		
CW004-0	138		
CW004-4	135		
CW004-6	131		
Bbb1		57	
Bbc2		125	
CW004-8	114		
SC1			1305
CW005-0	130		
CW005-3	123		
CW005-7	113		
CW006-0	146		
CW006-2	163		
SC1			82
Bbb1		115	
CW006-5	149		
CW006-7	105		
CW007-0	114		
CW007-3	137		
CW007-6	92		
CW007-8	157		
CW008-0	170		
Bbc1		75	
CW008-2	146		
CW008-5	149		
Bbb1		329	
CW008-7	121		
CW008-9	102		
CW009-0	169		
Btb1		63	
CW009-3	145		
CW009-7	95		
CW009-9	94		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW010-2	92		
CW010-4	102		
CW010-6	153		
CW010-8	127		
CW011-0	105		
CW011-3	102		
Bbb1		1697	
CW011-5	158		
CW011-8	146		
CW012-0	143		
Bbb1		149	
CW012-3	133		
CW012-6	92		
CW012-8	127		
CW013-0	137		
CW013-3	131		
CW013-6	84		
CW013-8	90		
CW014-0	111		
CW014-5	103		
Bbb1		79	
CW014-7	134		
Bbb1		1305	
CW014-9	150		
CW015-0	157		
CW015-3	106		
CW015-6	114		
Bbb1		222	
	AVG CW	AVG BW	AVG SC
	123	357	1026
STD	23	524	548
COUNT	60	12	4
TOT. AREA		4278	4104
CW016-0	123		
CW016-3	150		
CW016-6	122		
CW016-8	88		
CW017-0	102		
CW017-3	83		
CW017-5	90		
CW017-7	141		
CW018-0	141		
CW018-2	109		
CW018-5	103		
CW018-7	90		
CW018-9	101		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW019-1	133		
CW019-3	125		
Bbb1		45	
CW019-6	126		
Bbb1		143	
CW019-8	145		
CW020-0	133		
CW020-3	83		
Bbb1		64	
CW020-7	84		
CW021-0	130		
CW021-3	92		
CW021-5	80		
CW021-8	135		
CW022-0	126		
CW022-2	95		
CW022-4	110		
CW022-7	95		
CW023-0	117		
CW023-3	125		
CW023-4	92		
CW023-7	139		
CW023-9	106		
CW024-0	94		
CW024-3	98		
CW024-5	87		
CW024-8	130		
Bbc1		70	
CW025-0	149		
CW025-3	155		
Bbc1		304	
CW025-5	151		
CW025-8	131		
CW026-0	129		
SC1			1939
CW026-3	134		
CW026-6	157		
CW026-8	255		
Bbc1		354	
CW027-0	131		
CW027-5	189		
Btb1		2710	
CW027-7	243		
CW027-9	202		
CW028-0	190		
CW028-3	96		
CW028-6	121		
Bbb1		118	

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW028-8	155		
Bbb1		2039	
Bbb2		36	
CW029-0	209		
CW029-3	139		
CW029-5	117		
Bbb1		274	
CW029-6	142		
SC1			2789
CW029-8	161		
CW030-0	208		
CW030-3	63		
CW030-6	162		
CW030-8	110		
CW031-0	103		
CW031-5	119		
Bbb1		23	
CW031-8	229		
Btb1		3951	
CW032-0	110		
CW032-3	86		
CW032-5	101		
CW032-7	157		
Bbb1		521	
CW033-0	165		
Btb1		467	
CW033-4	95		
CW033-6	209		
CW033-8	98		
CW034-0	98		
CW034-4	110		
CW034-6	129		
CW034-8	75		
CW035-0	177		
Bbb1		875	
CW035-3	142		
Btb1		170	
CW035-6	109		
CW035-9	212		
Bbc1		115	
Btc2		132	
	AVG CW	AVG BW	AVG SC
	130	653	2364
STD	40	1043	425
COUNT	81	19	2
TOT. AREA		12412	4727
CW036-0	194		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW036-4	127		
CW036-7	115		
SC1			899
Bbb1		974	
CW036-9	157		
CW037-0	159		
CW037-4	125		
CW037-7	87		
Bbb1		57	
CW037-9	209		
CW038-0	146		
CW038-4	109		
CW038-6	143		
Bbb1		1117	
CW038-8	154		
CW039-0	145		
Bbb1		256	
CW039-5	161		
CW039-7	135		
		256	
CW040-0	68		
CW040-3	130		
Bbb1		107	
Bbc1		306	
CW040-6	172		
Bbc1		50	
CW040-8	135		
CW041-0	106		
CW041-3	130		
CW041-5	169		
CW041-7	188		
Bbb1		1353	
CW042-0	161		
CW042-3	201		
CW042-5	142		
CW042-7	82		
CW043-0	111		
CW043-3	78		
CW043-5	178		
CW043-7	134		
CW043-9	111		
CW044-0	180		
CW044-4	178		
Bbb1		29	
CW044-7	192		
Bbb1			
CW044-9	157		
CW045-0	117		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW045-4	118		
CW045-6	103		
Bbb1		95	
CW045-8	119		
CW046-0	145		
CW046-4	92		
Bbb1		499	
CW046-8	176		
Bbc1		124	
CW047-0	188		
CW047-5	130		
CW047-7	177		
CW047-9	174		
Bbb1		419	
Btb1		5177	
CW048-0	133		
CW048-3	79		
CW048-6	121		
Bbb1		754	
CW048-8	119		
CW049-0	110		
CW049-4	98		
CW049-6	125		
CW049-8	158		
CW050-0	176		
CW050-5	99		
CW050-7	105		
CW050-9	162		
CW051-0	153		
CW051-5	74		
CW051-8	150		
CW052-0	125		
CW052-4	87		
CW052-7	123		
CW052-9	78		
CW053-0	151		
Bbb1		1799	
CW053-4	161		
CW053-6	182		
Bbb1		1459	
CW053-8	131		
CW054-0	91		
CW054-3	139		
Bbb1		415	
Bbb2		166	
CW054-5	146		
Bbb1		702	
Bbb2		870	

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW054-8	129		
CW055-0	193		
Bbb1		288	
SC1-0			10350
CW055-5	188		
SC1-5			
CW055-8	151		
	AVG CW	AVG BW	AVG SC
	142	751	5624
STD	58	1063	4726
COUNT	79	23	2
TOT. AREA		17272	11248
CW056-0	115		
CW056-4	138		
CW056-6	123		
CW056-8	107		
CW056-9	118		
Bbc1		367	
CW057-0	184		
CW057-3	119		
CW057-5	90		
CW057-8	111		
CW058-0	206		
CW058-3	176		
CW058-6	122		
CW058-8	114		
CW059-0	168		
Bbb1		2851	
CW059-3	139		
Btb1		1874	
CW059-6	70		
CW059-8	182		
Btc1		82	
CW060-0	119		
Bbb1		147	
CW060-3	192		
CW060-6	133		
CW060-9	83		
CW061-2	145		
CW061-6	193		
CW061-8	162		
Bbb1		467	
CW062-0	143		
Bbc1		21	
CW062-3	163		
Bbb1		1421	
CW062-6	129		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW062-8	142		
CW063-0	123		
Bbb1		188	
CW063-3	110		
Bbb1		383	
CW063-6	137		
CW063-9	197		
Btb1		55	
CW064-0	235		
B-b1		739	
Bbb2		45	
Btb3		222	
CW064-4	149		
Btb1		23	
CW064-7	133		
CW065-0	159		
CW065-3	172		
CW065-7	145		
CW065-9	131		
Bbb1		34	
CW066-0	166		
CW066-2	102		
CW066-5	172		
Bbb1		1264	
CW066-8	185		
CW067-0	134		
CW067-4	170		
CW067-7	99		
CW067-9	142		
CW068-0	122		
CW068-4	123		
CW068-7	96		
CW068-9	196		
CW069-0	176		
CW069-4	131		
CW069-7	90		
CW069-9	121		
CW070-2	150		
CW070-5	131		
Bbb1		897	
CW070-8	233		
Bbc1		299	
Bbc2		91	
Bbc3		204	
CW071-0	166		
CW071-3	118		
CW071-6	130		
Bbb1		3372	

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW071-8	127		
CW072-0	130		
CW072-5	107		
CW072-8	96		
CW073-0	76		
CW073-3	80		
CW073-6	87		
CW073-8	149		
CW074-0	109		
CW074-4	102		
CW074-6	110		
SC1-6			6381
CW074-8	181		
SC1-8			
CW075-0	163		
Bbb1		1223	
CW075-3	138		
CW075-6	147		
Bbb1		317	
CW075-8	146		
	AVG CW	AVG BW	AVG SC
	139	691	6381
STD	35	887	0
COUNT	77	24	1
TOT. AREA		16588	6381
CW076-0	133		
CW076-3	130		
SC1-3			24190
CW076-6	190		
SC1-6			
CW076-8	115		
CW077-0	107		
CW077-3	76		
CW077-6	111		
CW077-8	95		
SC1-8			5187
CW078-0	133		
SC1-0			
Bbb1		29	
CW078-4	99		
CW078-6	74		
CW078-8	90		
CW079-0	114		
Bbb1		277	
CW079-5	157		
CW079-8	99		
CW080-0	86		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW080-4	113		
CW080-6	142		
CW080-8	115		
CW081-0	78		
CW081-4	84		
CW081-6	166		
CW081-8	96		
Bbb1		181	
CW082-8	214		
CW082-5	119		
CW082-8	115		
CW083-0	125		
CW083-3	184		
Bbc1		43	
CW083-6	105		
Btb1		70	
CW083-8	80		
Bbb1		79	
CW084-0	95		
CW084-3	172		
CW084-6	119		
Bbb1		116	
CW084-8	129		
CW085-0	130		
B-b1		532	
CW085-3	248		
Bbb1		158	
CW085-6	158		
CW085-8	141		
CW086-0	130		
CW086-3	117		
CW086-6	188		
CW086-8	197		
CW087-0	146		
Btb1		1165	
CW087-4	146		
CW087-6	123		
Btb1		118	
CW087-8	130		
CW088-0	177		
Bbb1		145	
CW088-4	147		
CW088-6	172		
Bbb1		1693	
Bbb2		387	
CW088-8	160		
CW089-0	218		
CW089-4	154		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW089-6	111		
CW089-8	88		
CW090-0	90		
CW090-3	134		
CW090-6	125		
CW090-8	126		
CW091-0	70		
CW091-4	193		
CW091-7	158		
CW091-9	126		
CW092-2	105		
CW092-5	122		
CW092-7	190		
CW092-9	129		
CW093-2	155		
CW093-5	169		
CW093-7	119		
CW093-9	133		
CW094-0	138		
CW094-3	133		
CW094-5	106		
CW094-7	72		
CW094-9	153		
Bbb1		183	
CW095-0	154		
SC1			4679
CW095-3	123		
CW095-7	162		
CW095-9	134		
	AVG CW	AVG BW	AVG SC
	132	345	11352
STD	36	455	9080
COUNT	79	15	3
TOT. AREA		5175	34057
CW096-0	122		
Bbb1		32	
B-b2		362	
CW096-5	138		
CW096-7	143		
Btb1		43	
SC1-7			10412
CW096-9	194		
SC1-9			
CW097-0	189		
Btb1		580	
CW097-3	133		
CW097-5	123		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW097-8	139		
CW098-0	126		
CW098-3	125		
CW098-6	129		
CW098-8	131		
CW099-0	192		
CW099-3	110		
CW099-5	141		
CW099-7	200		
CW099-9	149		
CW100-0	166		
CW100-3	123		
CW100-5	88		
CW100-8	162		
CW101-0	123		
CW101-4	87		
CW101-7	157		
SC1			4196
CW102-0	115		
CW102-4	201		
CW102-6	263		
CW102-8	147		
CW103-0	131		
CW103-3	111		
CW103-5	118		
Bbb1		86	
CW103-7	162		
CW103-9	180		
Btb1		150	
CW104-2	144		
SC1-2			25850
CW104-4	192		
Bbb1		128	
SC1-4			
CW104-7	165		
SC1-7			14862
CW104-9	165		
SC1-9			
CW105-2	151		
B-b1		1578	
CW105-4	165		
CW105-6	127		
CW105-8	144		
CW106-0	117		
CW106-3	131		
CW106-6	168		
CW106-8	159		
CW107-0	124		

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW107-5	138		
CW107-7	162		
SC1-7			25828
CW108-0	190		
SC1-0			
CW108-3	165		
SC1-3			
Btc1		1808	
SC2			2080
CW108-6	137		
CW108-8	130		
CW109-0	134		
Btb1		144	
CW109-4	113		
CW109-6	147		
CW109-8	161		
SC1			3440
CW110-0	134		
CW110-4	147		
CW110-6	172		
CW110-8	148		
CW111-0	144		
CW111-3	141		
CW111-7	137		
Bbb1		104	
CW112-0	110		
CW112-3	285		
CW112-6	185		
SC1			2444
CW112-8	159		
CW113-0	128		
Bbc1		18	
SC1-0			5156
CW113-5	190		
SC1-5			5480
CW113-7	165		
SC1			16772
CW113-9	142		
CW114-2	154		
CW114-4	104		
Btb1		1090	
Btb2		62	
CW114-7	221		
CW114-9	141		
CW115-0	158		
CW115-4	149		
CW115-7	140		
Bbb1		1326	

GREEN RIVER - MONITORING AREA #3

RIVER MI	CW	BW	SC
CW115-9	176		
Bbb1		2938	
	AVG CW	AVG BW	AVG SC
	150	653	10593
STD	33	832	8571
COUNT	79	16	11
TOT. AREA		10449	116520
CW116-0	137		
CW116-4	80		
CW116-6	144		
Btc1		104	
CW116-8	199		
CW117-0	116		
CW117-5	99		
CW117-7	158		
CW117-9	210		
Btc1		426	
CW118-0	109		
CW118-4	144		
CW118-7	195		
Bbb1		1152	
Btb2		386	
CW118-9	140		
Bbb1		86	
CW119-2	350		
SC1			2078
SC2			7010
CW119-5	198		
Btc1		90	
CW119-7	131		
CW119-9	100		
CW120-2	159		
CW120-5	182		
Btc1		40	
CW120-7	141		
CW120-9	116		
	AVG CW	AVG BW	AVG SC
	155	326	4544
STD	57	366	2466
COUNT	20	7	2
TOT. AREA		2284	9088

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW200-0	213		
CW200-3	260		
Bbb1		59	
CW200-6	230		
CW200-7	173		
CW200-8	202		
Btb1		29	
CW200-9	221		
Bbb1		13189	
CW201-0	249		
CW201-4	253		
Btc1		90	
CW201-6	217		
CW201-8	166		
SC1-8			33403
CW201-9	300		
SC1-9			
Btc1		26	
CW202-0	287		
SC1-0			
Btc1		75	
CW202-3	164		
B-b1		163	
CW202-6	145		
CW202-8	136		
CW202-9	140		
CW203-0	349		
Bbb1		72	
Btb2		1115	
SC1			2312
CW203-3	274		
CW203-5	213		
CW203-7	124		
CW204-0	155		
CW203-9	230		
Btb1		45	
CW204-4	144		
CW204-6	135		
CW204-8	175		
CW204-9	284		
Bbb1		346	
CW205-0	235		
Btc1		334	
Bbb2		78	
CW205-3	511		
CW205-7	338		
Bbc1		13	
CW205-9	224		

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW206-0	173		
CW206-1	136		
CW206-3	123		
CW206-6	177		
CW206-8	249		
Bbc1		146	
CW206-9	464		
CW207-0	0		
CW207-3	296		
CW207-5	174		
CW207-7	146		
CW207-9	132		
CW208-0	248		
CW208-3	257		
CW208-5	199		
CW208-7	321		
CW208-9	298		
CW209-0	211		
CW209-3	249		
CW209-6	375		
CW209-8	286		
CW209-9	201		
CW210-0	144		
SC1-0			6046
CW210-3	188		
SC1-3			
CW210-5	241		
Bbb1		3490	
CW210-7	208		
CW210-9	193		
CW211-0	164		
CW211-3	130		
CW211-5	193		
Bbb1		4789	
CW211-7	343		
CW211-9	257		
CW212-0	188		
CW212-4	136		
CW212-6	182		
Bbb1		422	
CW212-8	259		
SC1R-8			27686
SC2			4552
CW213-0	229		
SC1R-0			
CW213-3	159		
CW213-5	127		
Bbb1		14	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW213-7	284		
CW213-9	293		
CW214-0	137		
CW214-3	253		
Bbb1		320	
CW214-5	259		
CW214-6	314		
CW214-7	429		
CW214-8	76	170	
Bbc1		136	
SC1			10994
Btb2		411	
CW214-9	315		
Btc1		568	
Bbc2		531	
Bbb3		2723	
CW215-0	165		
Btb1		448	
CW215-2	179		
Bbb1		262	
SC1			4109
CW215-5	323		
Bbb1		2736	
CW215-6	376		
SC1			2526
CW215-7	364		
CW215-9	331		
Bbb1		186	
	AVG CW	AVG BW	AVG SC
	228	1100	11454
STD	87	2521	11399
COUNT	83	30	8
TOT. AREA		32986	91629
CW216-0	284		
B-b1		2667	
CW216-2	257		
CW216-5	224		
SC1-5			20938
CW216-7	281		
SC1-7			
CW217-0	351		
Bbb1		184	
Btb2		240	
SC1-0			32504
CW217-3	335		
SC1-3			
Bbc1		259	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW217-5	380		
SC1-5	997		
Bbc1		531	
Bbc2		120	
SC2			7458
CW217-7	286		
CW217-9	234		
CW218-0	234		
Bbb1		1026	
CW218-3	293		
Bbc1		1254	
Bbc2		898	
Btb3		146	
CW218-5	281		
CW218-7	307		
Btc1		78	
CW218-9	0		
Bbc1		3766	
CW219-0	307		
Bbc1		94	
SC1			1250
CW219-4	340		
CW219-6	235		
Bbc1		390	
Btb2		6920	
CW219-8	230		
Bbb1		1010	
Bbb2		104	
CW220-0	267		
CW220-1	185		
Btb1		267	
CW220-3	320		
CW220-5	314		
CW220-7	405		
CW220-9	0		
Bbb1		704	
CW221-0	329		
CW221-2	230		
CW221-5	201		
CW221-7	203		
CW221-9	480		
CW222-0	229		
CW222-1	403		
CW222-3	476		
Bbc1		70	
CW222-4	372		
CW222-6	352		
SC1-6			5134

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW222-8	406		
SC1-8			
CW223-0	358		
Bbb1		4456	
CW223-2	265		
CW223-5	170		
CW223-7	251		
Bbc1		269	
SC1			2117
Bbc2		6	
CW223-9	231		
CW224-0	202		
CW224-3	364		
CW224-5	352		
CW224-7	305		
CW224-8	221		
CW225-6	0		
Bbb1		1461	
CW225-0	203		
CW225-3	0		
CW225-8	0		
Btb1		206	
Bbb2		229	
CW226-0	295		
Bbc1		762	
Bbc2		1045	
CW226-3	174		
Bbb1		58	
CW226-5	175		
CW226-6	215		
CW226-7	215		
CW226-8	189		
Bbc1		75	
CW226-9	189		
Bbc1		59	
CW227-0	196		
Bbb1		728	
Bbb2		1960	
Bbb3		24	
CW227-3	222		
CW227-4	263		
SC1-4			47152
CW227-5			
Bbb1-5		1114	
SC1-5			
CW227-7			
SC1-7			
CW227-9	304		

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
SC1-9			
CW228-0	414		
Bbc1		1101	
Bbc2		379	
SC1-0			
CW228-3	293		
SC1-3			
SC2			728
CW228-5	237		
CW228-7	224		
B-b1		178	
CW228-8	203		
CW228-9	197		
CW229-0	187		
CW229-3	194		
CW229-5	179		
CW229-6	173		
CW229-7	370		
Bbb1		21	
Bbb2		18	
Bbc3		19	
Bbc4		104	
SC1			450
CW229-9	0		
SC1			4645
SC2			726
CW230-0	298		
CW230-3	203		
CW230-5	191		
CW230-7	177		
CW230-9	160		
CW231-0	150		
CW231-3	145		
CW231-4	207		
SC1-4			62518
CW231-6	0		
SC1-6			
Bbb1		19	
CW231-8	339		
SC1-8			
Bbc1		224	
CW231-9	284		
SC1-9			
CW232-0	197		
CW232-4	177		
CW232-6	226		
CW232-7	0		
CW232-9	0		

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
Bbc1		298	
CW233-0	352		
SC1			733
Btc1		502	
Bbc2		22	
CW233-3	271		
CW233-5	177		
CW233-7	141		
Bbb1		178	
CW233-9	224		
Bbc1-9		4202	
CW234-0	224		
Bbc1-0		643	
RM234-4	0		
CW234-6	370		
Bbb1		240	
CW234-8	271		
SC1			15099
SC2			1272
CW235-0	191		
CW235-3	146		
Bbb1		955	
Bbb2		242	
CW235-5	177		
Bbc1		270	
CW235-6	265		
CW235-7	177		
Bbb1		2582	
CW235-9	248		
Bbc1		733	
	AVG CW	AVG BW	AVG SC
	241	823	13515
STD	129	1299	18669
COUNT	104	56	15
TOT. AREA		46110	202723
CW236-0	272		
CW236-3	394		
SC1			4088
CW236-5	267		
Btb1		5152	
CW236-7	146		
Bbb1		43	
CW237-0	225		
Bbb1		74	
Bbb2		54	
CW237-3	246		
Bbb1		2819	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
Bbb2		469	
CW237-5	283		
CW237-7	274		
CW237-9	302		
SC1			5842
Bbc1		112	
CW238-0	318		
Bbc1		163	
SC1			1584
Bbc2		59	
CW238-3	346		
SC1			2059
SC2			893
SC3-3			34237
CW238-5	267		
SC1-5			
Bbc1		342	
SC2-5R			5283
CW238-7	283		
SC1-7R			
RM238-9	0		
RM239-0	0		
RM239-2	0		
Bbb1		1882	
RM239-4	0		
RM239-6	0		
Bbc1		50	
Bbc2		1363	
RM239-7	0		
RM239-9	0		
CW240-0	386		
SC1			8555
Bbc1		66	
CW240-3	300		
CW240-6	194		
CW240-7	316		
CW240-9	311		
Bbb1		9701	
Bbb2		325	
Bbb3		507	
CW241-0	207		
Bbb1		262	
CW241-4	177		
Bbb1		171	
CW241-6	164		
Bbc1		48	
Bbc2		130	
CW241-9	144		

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW242-0	197		
Bbb1		179	
Bbc2		2130	
SC1-0			9378
CW242-3	235		
Bbc1		141	
CW242-5	260		
SC1			3997
SC2			1432
CW242-8	271		
Bbb1		2203	
Bbb2		126	
CW243-0	236		
Btb1		1462	
CW243-3	95		
Bbc1		42	
Bbc2		27	
CW243-5	245		
Bbb1		2688	
CW243-7	177		
Bbb1		952	
CW243-9	216		
Bbc1		130	
Bbc2		1445	
CW244-0	183		
SC1			2990
Bbb1		320	
CW244-3	178		
Bbb1		51	
CW244-6	217		
Bbb1		216	
Bbb2		5	
Bbc3		886	
Bbc4		86	
SC1			6450
CW244-8	199		
Bbc1		1301	
SC1			2622
CW245-0	163		
CW245-4	157		
CW245-6	104		
Bbb1		53	
CW245-8	179		
CW246-0	197		
CW246-3	175		
CW246-7	151		
CW246-9	239		
CW247-0	410		

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
Bbb1		37	
Bbb2		256	
CW247-3	189		
CW247-5	89		
CW247-8	124		
Bbb1		1091	
SC1			1400
CW248-0	191		
Btb1		3010	
B-b2		171	
CW248-3	234		
CW248-5	217		
CW248-8	192		
SC1			4638
CW249-0	278		
SC1			4709
Bbc1		765	
CW249-3	184		
B-c1		608	
B-c2		136	
Bbb3		157	
SC1-3			48049
CW249-6	192		
SC1-6			
Bbb1		422	
Btb2		1442	
Bbc3		403	
CW249-8	192		
SC1-8			
CW250-0	282		
SC1-0			
Bbc1		453	
Bbc2		146	
SC2			3032
CW250-3	105		
SC1			1347
CW250-5	170		
Bbc1		131	
SC1			4989
CW250-8	131		
Bbc1		152	
CW251-0	185		
Bbb1		1280	
Btb2		813	
Bbb3		67	
SC1			646
CW251-3	309		
Bbb1		190	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
SC1			1093
SC2			419
CW151-6	193		
CW251-8	161		
Bbb1		72	
Bbb2		38	
CW252-0	296		
Bbc1		491	
Bbc2		86	
SC1-0			31233
CW252-3	249		
Bbb1		760	
Bbb2		80	
SC1-3			
CW252-6	159		
SC1-6			
Bbb1		522	
CW252-8	168		
Bbb1		245	
Bbc2		125	
CW253-0	168		
Bbb1		528	
CW253-3	220		
SC1			1610
CW253-6	235		
SC1			1381
Bbb1		131	
CW253-8	151		
CW254-0	229		
Bbc1		7894	
CW254-3	231		
CW254-5	329		
CW254-8	184		
Btc1		1309	
CW255-0	155		
Bbb1		43	
Bbc2		43	
Bbc3		43	
CW255-2	184		
Bbb1		160	
Bbc2		163	
CW255-7	226		
Bbb1		8608	
CW255-9	199		
Bbc1		282	
	AVG CW	AVG BW	AVG SC
	201	884	7184
STD	88	1765	11343

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
COUNT	86	81	27
TOT. AREA		71589	193956
CW256-0	211		
Bbb1		1901	
SC1			4541
CW256-3	196		
Bbc1		371	
CW256-6	149		
CW256-8	192		
Bbb1		72	
Bbb2		198	
CW257-0	196		
CW257-3	188		
Btb1		107	
SC1			5538
CW257-7	183		
CW257-9	69		
Bbb1		1490	
CW258-0	235		
Bbb1		123	
CW258-3	168		
Bbb1		240	
CW258-6	176		
CW258-8	165		
CW259-0	258		
Bbb1		1141	
SC1			3510
CW259-3	213		
Bbc1		266	
Bbb2		253	
CW259-6	262		
Bbc1		266	
Bbc2		2422	
SC1			13522
CW259-8	237		
Bbc1		155	
CW260-0	237		
Bbc1		32	
Bbc2		98	
SC1			2355
CW260-3	151		
CW260-6	156		
Bbb1		166	
CW260-8	262		
Bbc1		944	
CW261-0	254		
B-c1		261	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
Bbb2		200	
B-c3		434	
Bbc4		122	
SC1-0			45439
CW261-3	318		
SC1-3			563
SC2			
Bbc1		66	
Bbc2		286	
CW261-6	335		
SC1-6			
B-b1		374	
Bbb2		58	
CW261-8	211		
Bbb1		82	
Bbc2		13	
CW262-0	179		
SC1			2072
Bbc1		37	
CW262-4	217		
Bbb1		1654	
Bbb2		10168	
CW262-7	320		
Bbc1		102	
CW262-9	241		
SC1-9			6592
CW263-0	239		
SC1-0			
Bbc1		266	
B-c2		50	
CW263-3	173		
SC1			1590
Bbc1		341	
CW263-6	264		
Bbb1		1106	
CW263-8	220		
Bbc1		35	
CW264-0	202		
Bbc1		38	
Bbb2		22	
Bbc3		282	
CW264-3	264		
Bbb1		203	
CW264-6	179		
CW264-9	167		
Bbb1		16	
SC1			1102
CW265-1	154		

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW265-5	232		
Bbb1		1627	
CW265-8	161		
Btb1		61	
SC1			3682
CW266-0	152		
Bbb1		29	
CW266-4	254		
Bbb1		19	
CW266-7	271		
Bbb1		437	
CW266-9	213		
Bbc1		189	
B-c2		96	
SC1			5901
CW267-2	109		
CW267-4	221		
Bbb1		66	
Bbc2		421	
Bbc3		342	
SC1-4			6650
Bbc4		88	
CW267-7	306		
SC1-7	985		
Bbb1		128	
Bbb2		29	
Btc3		342	
Bbc4		82	
CW267-9	133		
CW268-0	102		
CW268-4	241		
CW268-6	147		
CW268-8	175		
CW269-0	225		
Bbc1		150	
SC1			3731
CW269-3	177		
SC1			5896
Bbb1		395	
CW269-7	211		
Bbb1		1093	
Bbc2		253	
Bbb3		91	
CW269-9	197		
CW270-0	137		
Btc1		101	
SC1			3600
Btc2		1202	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW270-3	206		
Bbb1		590	
CW270-6	258		
Bbb1		83	
CW270-8	175		
Bbb1		3371	
CW271-0	298		
Bbb1		659	
Bbc2		104	
SC1			5755
SC2			544
CW271-3	328		
Bbb1		1456	
CW271-5	243		
Bbb1		451	
CW271-8	152		
B-c1		179	
CW272-0	126		
CW272-3	281		
SC1			1338
Bbc1		562	
CW272-5	278		
Bbc1		3678	
Bbb2		141	
CW272-8	196		
SC1			4166
Bbb1		78	
CW273-0	211		
SC1-0			19342
CW273-3	279		
SC1-3			
Btb1		506	
Btc2		509	
CW273-5	138		
SC1-5			
CW273-8	174		
Bbc1		403	
SC1			4792
CW274-0	269		
Bbc1		94	
Bbc2		267	
Bbc3		42	
SC1			6099
CW274-4	189		
Bbb1		2704	
CW274-6	193		
Bbc1		210	
Bbc2		478	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW274-8	246		
SC1			7979
Bbc1		146	
CW275-0	216		
SC1			1795
SC2			827
B-c1		526	
B-c2		373	
CW275-3	251		
Bbb1		3248	
Bbb2		32	
CW275-5	163		
SC1			3894
Bbc1		69	
CW275-8	262		
Bbc1		246	
B-c2		987	
	AVG CW	AVG BW	AVG SC
	220	601	6172
STD	102	1245	8506
COUNT	80	93	28
TOT. AREA		55893	172817
CW276-0	314		
Bbb1		235	
Bbb2		133	
CW276-3	283		
Bbc1		19	
CW276-5	222		
Bbc1		34	
Bbc2		1558	
Bbc3		208	
CW276-7	202		
Bbc1		494	
SC1			470
Bbc2		453	
SC2			2659
CW277-0	254		
Bbc1		11	
Bbc2		342	
Bbc3		99	
CW277-3	184		
Bbb1		1229	
CW277-5	274		
Bbc1		227	
CW277-8	235		
Bbc1		184	
Bbb2		45	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
Bbc3		86	
CW278-0	209		
Bbb1		2296	
CW278-3	316		
Bbb1		37	
CW278-5	194		
Bbc1		96	
CW278-8	232		
Bbc1		438	
B-c2		83	
SC1			598
CW279-0	245		
CW279-3	334		
Bbc1		654	
Bbc2		349	
CW279-6	273		
Bbc1		150	
CW279-8	171		
Bbc1		50	
SC1-8			14719
CW280-2	342		
Bbc1		138	
B-c2		1197	
Bbc3		598	
SC1-2			
CW280-5	279		
CW280-8	264		
SC1			5355
CW280-9	268		
CW281-0	194		
CW281-2	241		
Bbb1		514	
CW281-5	259		
Bbc1		150	
CW281-7	186		
CW281-9	273		
Bbc1		283	
Bbc2		466	
SC1			1848
CW282-0	281		
CW282-2	109		
CW282-4	91		
CW282-6	173		
SC1			6341
CW282-8	249		
Bbc1		934	
SC1			5179
Bbb2		34	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW283-0	156		
CW283-3	203		
Bbb1		238	
CW283-5	259		
Bbc1		42	
SC1-5			20362
CW283-7	267		
SC1-7			
CW284-0	108		
CW284-2	245		
CW284-4	175		
Bbb1		202	
CW284-6	295		
CW284-9	302		
SC1			3614
Bbb1		765	
CW285-2	178		
Bbb1		334	
CW285-5	232		
Bbc1		181	
CW285-7	230		
Bbb1		67	
CW286-0	198		
SC1-0			9797
CW286-3	335		
Btc1		54	
Bbc2		245	
Btc3		350	
Bbc4		195	
SC1-3			
CW286-6	204		
Bbb1		146	
CW286-8	198		
CW287-0	161		
Bbb1		1430	
CW287-3	249		
CW287-6	189		
Bbb1		2469	
SC1			5178
Btc2		320	
CW287-8	245		
B-c1		1136	
Bbb2		1002	
Bbc3		259	
CW288-0	226		
CW288-3	260		
SC1-3			12852
CW288-7	187		

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
SC1-7			
CW289-0	208		
CW289-3	249		
Bbc1		198	
CW289-5	207		
SC1			10011
Bbc1		149	
CW289-7	277		
Bbc1		594	
Bbc2		621	
SC1-7			17280
Bbb3		80	
CW290-0	245		
Bbc1		800	
SC1-0			
Bbc2		46	
CW290-3	312		
Bbc1		90	
Btc2		26	
CW290-6	234		
SC1-6			16187
CW290-8	264		
Bbc1		912	
Bbc2		920	
SC1-8			
Bbb3		365	
CW291-0	154		
CW291-4	201		
Bbb1		1952	
Bbc2		35	
CW291-6	185		
SC1			2898
CW291-8	320		
Bbb1		3990	
Bbb2		34	
CW292-0	320		
Bbc1		19	
CW292-4	209		
Bbc1		291	
Bbb2		160	
CW292-7	339		
Btb1		59	
Bbb2		40	
CW292-8	292		
SC1			6643
Btc1		14	
CW293-0	208		
Btc1		27	

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
SC1-0			9742
CW293-4	292		
SC1-4			
Bbc1		211	
CW293-6	292		
Bbb1		117	
Bbc2		50	
CW293-8	218		
Btb1		165	
Bbc2		50	
SC1			3589
CW294-0	339		
Bbc1		147	
Bbc2		22	
Bbc3		1461	
Bbc4		451	
SC1			7955
SC2-0			6837
CW294-2	345		
Bbc1		1630	
SC1-2			
CW294-4	169		
Bbb1		299	
Bbb2		768	
CW294-6	282		
Bbb1		346	
Bbb2		90	
Bbc3		826	
SC1-6			13749
CW294-8	237		
Bbc1		54	
Bbc2		91	
Bbc3		197	
SC1-8			
CW295-0	258		
SC1			9475
Bbc1		77	
SC2			5770
CW295-3	110		
Bbb1		301	
CW295-6	146		
CW295-8	198		
	AVG CW	AVG BW	AVG SC
	236	442	7964
STD	58	624	5279
COUNT	82	95	25
TOT. AREA		42035	199109

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW296-0	194		
CW296-3	157		
Bbb1		5309	
CW296-5	149		
CW296-7	203		
Btc1		58	
CW297-0	249		
Bbb1		184	
Bbc2		163	
Bbb3		347	
Bbc4		29	
CW297-2	202		
CW297-5	316		
Bbc1		19	
SC1-5			31909
CW297-7	248		
SC1-7			
CW297-9	267		
SC1			7306
CW298-0	178		
Bbb1		586	
CW298-4	227		
Bbc1		69	
CW298-6	163		
CW298-8	175		
SC1			4026
CW299-0	167		
CW299-4	237		
SC1			3316
SC2			5237
SC3			651
CW299-7	204		
Bbb1		537	
Bbc2		176	
SC1-7			34560
CW300-0	186		
SC1-0			
Btb1		92	
Btb2		55	
Bbb3		5031	
CW300-4	265		
SC1-4			
Bbc1		131	
CW300-6	266		
SC1-6			
CW300-8			
CW301-2	231		
SC1			1207

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW301-6	196		
CW301-8	223		
Bbb1		123	
Bbb2		529	
CW302-0	197		
Bbc1		59	
Bbc2		47	
CW302-4	272		
Bbb1		519	
Bbb2		3940	
CW302-7	202		
SC1			17528
CW303-0	189		
Bbc1		14	
Bbc2		59	
CW303-4	171		
CW303-7	115		
CW303-9	179		
CW304-0	141		
Btb1		131	
Bbc2		51	
CW304-4	147		
Bbc1		553	
CW304-7	230		
Bbb1		20	
CW305-0	162		
Bbc1		88	
CW305-3	168		
Bbc1		151	
CW305-6	172		
CW305-8	192		
Bbb1		921	
SC1			1029
CW306-0	154		
CW306-4	112		
Btb1		149	
Bbb2		47	
CW306-7	206		
Bbc1		18	
SC1			8334
CW307-0	140		
Btb1		619	
CW307-4	137		
CW307-7	134		
B-b1		2246	
Btb2		1433	
CW307-9	158		
SC1			1762

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW308-0	125		
CW308-4	194		
Bbc1		20	
Bbc2		10	
Bbb3		29	
Btc4		59	
CW308-7	130		
Bbc1		35	
CW308-9	153		
CW309-0	133		
CW309-4	115		
CW309-6	90		
CW309-8	106		
CW310-0	106		
Bbb1		212	
CW310-5	101		
CW310-8	129		
CW311-0	125		
CW311-4	92		
CW311-6	118		
CW311-8	120		
Bbb1		259	
Bbb2		427	
CW312-0	79		
Btb1		4228	
CW312-4	94		
CW312-6	67		
CW312-8	99		
Bbb1		894	
CW313-0	139		
CW313-3	118		
CW313-6	127		
CW313-8	165		
SC1			1445
CW314-0	106		
Bbb1		167	
CW314-5	109		
CW314-8	104		
Bbb1		604	
SC1			1701
CW315-0	123		
B-b1		408	
CW315-4	172		
CW315-6	125		
SC1-6			11903
Bbb1		27	
CW315-8	253		
SC1-8			

GREEN RIVER - MONITORING AREA #4

RIVER MI	CW	BW	SC
CW315-9	90		
B-b1		127	
	AVG CW	AVG BW	AVG SC
	163	628	8794
STD	54	1242	10614
COUNT	74	51	15
TOT. AREA		32008	131914
CW316-0	88		
CW316-3	140		
Bbb1		12	
CW316-5	63		
CW316-8	136		
CW317-0	153		

Mission of the Bureau of Reclamation

The Bureau of Reclamation of the U.S. Department of the Interior is responsible for the development and conservation of the Nation's water resources in the Western United States.

The Bureau's original purpose "to provide for the reclamation of arid and semiarid lands in the West" today covers a wide range of interrelated functions. These include providing municipal and industrial water supplies; hydroelectric power generation; irrigation water for agriculture; water quality improvement; flood control; river navigation; river regulation and control; fish and wildlife enhancement; outdoor recreation; and research on water-related design, construction, materials, atmospheric management, and wind and solar power.

Bureau programs most frequently are the result of close cooperation with the U.S. Congress, other Federal agencies, States, local governments, academic institutions, water-user organizations, and other concerned groups.

A free pamphlet is available from the Bureau entitled "Publications for Sale." It describes some of the technical publications currently available, their cost, and how to order them. The pamphlet can be obtained upon request from the Bureau of Reclamation, Attn D-7923A, PO Box 25007, Denver Federal Center, Denver CO 80225-0007.